

PREHOSPITAL CARE

Critical incident exposure in South African emergency services personnel: prevalence and associated mental health issues

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Objectives: To assess critical incident exposure among prehospital emergency services personnel in the developing world context of South Africa; and to assess associated mental health consequences.

Methods: We recruited a representative sample from emergency services in the Western Cape Province, South Africa, to participate in this cross sectional epidemiological study. Questionnaires covered critical incident exposure, general psychopathology, risky alcohol use, symptoms of post-traumatic stress disorder (PTSD), and psychological and physical aggression between co-workers. Open ended questions addressed additional stressors.

Results: Critical incident exposure and rates of general psychopathology were higher than in studies in the developed world. Exposure to critical incidents was associated with general psychopathology, symptoms of PTSD, and with aggression between co-workers, but not with alcohol use. Ambulance, fire, and sea rescue services had lower general psychopathology scores than traffic police. The sea rescue service also scored lower than traffic police on PTSD and psychological aggression. The defence force had higher rates of exposure to physical assault, and in ambulance services, younger staff were more vulnerable to assault. Women had higher rates of general psychopathology and of exposure to psychological aggression. Other stressors identified included death notification, working conditions, and organisational problems.

Conclusions: Service organisations should be alert to the possibility that their personnel are experiencing work-related mental health and behavioural problems, and should provide appropriate support. Attention should also be given to organisational issues that may add to the stress of incidents. Workplace programmes should support vulnerable groups, and address death notification and appropriate expression of anger.

Exposure to traumatic stressors is potentially an integral part of the job for emergency services personnel. Traumatic stressors, or critical incidents, are those in which personnel are exposed to death or life threatening injury. In addition to the risk of mortality,¹ serious mental health and behavioural problems are associated with such traumatic exposure.^{2–7} These include post-traumatic stress disorder (PTSD), anxiety, and depression.

However, most studies have been conducted in the developed world. Rates of both critical incident exposure and of mental health problems are thus undocumented in the relatively more violent developing world. South Africa has a very high rate of violence; for instance, the 2001 homicide rate of 88 per 100 000 in Cape Town is much higher than the estimated global rate of 28.8 per 100 000.² Furthermore, studies in the developed world appear to find a relatively stable prevalence of mental health problems.³ It is possible that higher exposure may lead to higher rates of mental health problems; it is also possible that mental health problems do not increase beyond a certain amount of exposure.

In addition, although anger associated with critical incident exposure has received some attention in relation to the families of emergency services personnel,⁴ we could identify no studies of whether traumatic exposure is associated with aggression between staff members, yet good relationships with co-workers are key to good job performance and to improved coping after critical incidents.⁵

Finally, few studies have been able to explore differences between services.⁶ Such differences may indicate different needs for intervention.

This study addresses these gaps in the literature by assessing prevalence of exposure to critical incidents and of mental health problems, in a representative sample of emergency services personnel in the developing world context of the Western Cape Province, South Africa.

METHODS

Participants

All but one of the organisations serving an emergency response function in the Western Cape Province agreed to participate. This one service, a volunteer first aid service, did not respond to repeated attempts to contact them. Services thus included were the traffic police services; the fire services; the professional ambulance services (both public and private); the South African Red Cross Society; the St John's Ambulance; the National Sea Rescue Institute; and the air rescue, ambulance, and fire services of the South African National Defence Force.

Approval for the study was obtained from each service involved. Ethics approval was obtained from the research ethics committee of the Faculty of Health Sciences, University of Cape Town, and complies with the Declaration of Helsinki.

Measures

Questionnaires were developed in English and translated into Afrikaans, with the translation checked by back translation.

Abbreviations: CCI, Critical Incident Inventory; DSM-IV, *Diagnostic and Statistical Manual*, 4th ed; GHQ-28, 28 item General Health Questionnaire; IES-R, Impact of Event Scale, Revised; PTSD, post-traumatic stress disorder

All emergency services workers were fluent in one or both of these languages. Prior to the fieldwork, questionnaires were pilot tested with representatives from each organisation.

The first part of the questionnaire gathered demographic information. The Critical Incident Inventory (CCI)⁴ was used to assess exposure to critical incidents. It asks respondents to indicate the number of times each of 24 events has occurred in the past 2 months. Based on our pilot test, we adapted it slightly. The original instrument used the phrase "in the line of duty", so that, for instance, a participant might be asked to indicate whether they had experienced a "serious line of duty injury to yourself"; we adapted this to read "a serious injury to yourself while actively performing your duty". To one item, addressing exposure to blood or body fluids, we added the phrase "not needle stick injuries". Emergency services staff in South Africa are very aware of the danger of becoming infected with HIV via a needle stick injury, and we did not want this to inflate reporting on this item.

The 28 item General Health Questionnaire⁷ (GHQ-28), developed to identify psychiatric disorder in community samples, was used to identify staff members suffering from anxiety or depression. It identifies "caseness" as a total score of ≥ 5 .

An initial question queried whether the respondent currently used alcohol. Alcohol use problems were then identified using the CAGE questionnaire,⁸ which uses a score of ≥ 2 to indicate problem drinking over the respondent's lifetime.

The Impact of Event Scale—Revised⁹ (IES-R) is a 22 item scale assessing DSM-IV criteria for PTSD. It was presented immediately after the CCI, and respondents were asked to evaluate their responses to one or more of the incidents listed on the CCI. Responses were coded on a 5 point Likert-like scale ranging from "not at all" to "extremely".

Two subscales of the Revised Conflict Tactics Scale¹⁰ were adapted so that they reflected irritability and aggression between co-workers in the past 2 months, rather than between romantic partners. The two subscales that were used were physical assault, which had items such as "a co-worker threw something at me that could hurt me"; and psychological aggression, which had items such as "a co-worker insulted or swore at me".

Respondents were also asked to respond to two open ended questions: "List three things that you find most stressful about being an emergency worker" and "Is there anything else that you think would be important for the researchers to know about your work and how it affects you?".

Procedure

During a period of 2 weeks (11–24 November 2002), fieldworkers visited each base at a time convenient to the staff at that base, and randomly selected (from the staff on duty at the time of the visit) a number representing 0.3 of the total staff complement of that base. They then administered the questionnaires under conditions of confidentiality and anonymity. Participation was voluntary, and each participant gave written, informed consent for their participation. Where necessary, repeat visits were made to each base until the required number of questionnaires had been obtained. In a few cases, data collection continued until 11 December.

Two time periods were identified in the questionnaire: the past 2 months, and the past week. Fieldworkers introduced these to the respondents using timeline follow back techniques.¹¹

Data analysis

Appropriate sampling weights were used to compensate for instances where fieldworkers sampled too many or too few emergency services staff. Prevalence rates thus estimate

province wide prevalence. We used a locally weighted scatterplot smoother¹² to represent the associations graphically.

We controlled for age, sex, and length of service in exploring the association between critical incident exposure and each mental health index. In order to do so, we divided the sample into quartiles and used the lowest quartile as the cut point (<27 years of age and fewer than 3 years of service). To model the relationship between the mental health indices and critical incident exposure within subgroups such as service, sex, years of service, and age, we used linear regression. Linear and non-linear relationships were modelled. Least square means were estimated to obtain the mean difference between the subgroups, and for non-linear relationships the least square means and differences were estimated at three selected values of critical incident exposure. We also explored all possible interactions between service and other factors. In order to do this, we grouped the services into traffic police (both provincial and municipal), ambulance services (professional, both public and private), fire services, sea rescue, defence force, and volunteer ambulance services.

Responses to the open ended questions were coded post hoc, and then grouped into thematic categories.

RESULTS

Characteristics of study subjects

The survey returned 1099 complete and valid questionnaires. The population from which we sampled was 3897 in size, and we had intended to achieve a total sample size of 30%, or 1169. The sample was stratified by municipality and service into 29 strata, and sampling rates ranged from 26.6% to 47.8%, except in four cases. Three of the volunteer services had ceased their regular meetings for the year by the time of the study, and so were difficult to access, which resulted in sampling rates of 7.36%, 22.2%, and 24.1%. In addition, one of the rural ambulance services proved difficult to access (sampling rate of 18.0%). Low sampling rates appeared to be related to the administrative structure of the services and so are unlikely to be systematically related to the outcomes of interest.

The mean age of the respondents was 32.8 years (range 18–69). On average, respondents had served 8.2 years (range <1 year to 35 years). Further demographic details of the sample are reported in table 1.

Table 1 Demographic description of the sample

	n	% of sample (95% CI)
Sex		
Male	931	86 (84 to 87)
Female	158	14 (13 to 16)
Education		
Elementary only	14	1 (1 to 2)
Some secondary	594	55 (52 to 57)
Some tertiary	212	20 (18 to 22)
Completed tertiary	264	24 (22 to 26)
Home language		
English	365	34 (32 to 36)
Afrikaans	581	54 (52 to 56)
Xhosa	108	10 (9 to 12)
Other	22	2 (1 to 3)
Employment		
Volunteer	161	15 (14 to 16)
Reservist	23	2 (1 to 3)
Short-term contract	87	9 (7 to 9)
Permanent	810	75 (73 to 77)

Critical incident exposure and mental health indices

Mean critical incident exposure is documented by service in table 2. For the full sample, the median score was 11. The possible range for this scale was 0–72 (range of the reported results 0 to 69), and 127 respondents (11.6%) reported no critical incident exposure.

Table 2 also reports the mental health indices by service. Although mean rates of aggression are low, all 19 items in the psychological aggression and physical assault scales were each endorsed by at least two respondents. Some very serious items were also endorsed, in each case by over 25 respondents. These items included “a co-worker used a knife or a gun on me”; “a co-worker choked me”; “a co-worker beat me up”; and “a co-worker burned or scalded me on purpose”.

Associations

There was a significant linear association between exposure to critical incidents and scores on the GHQ-28, and significant non-linear associations between exposure and symptoms of PTSD and physical and psychological aggression. There was no association between exposure and substance misuse. These results are represented graphically in fig 1, and reported in detail in table 3.

Compared with the traffic police, the ambulance, fire and sea rescue services had significantly lower general health scores. The sea rescue service also had significantly lower Impact of Event and Psychological Aggression scores than the traffic police. The interaction terms between service membership and general health, impact of event and psychological aggression were not significant, indicating that critical incident exposure has the same effect on these indices regardless of service membership. This was not true, however, of physical assault (see Table 4): the defence force had a significantly higher rate of physical assault, as compared with the traffic police, and the interaction term between critical incident exposure and service, with respect to physical assault, was significant ($p = 0.0084$). It appears that in both the professional and volunteer ambulance services, younger staff members experience more physical assault in association with critical incident exposure ($p = 0.032$ and $p = 0.019$, respectively). In addition, female sex was associated with higher general health questionnaire scores and higher experience of psychological aggression.

Responses to open ended questions

Working conditions were mentioned most frequently (991 times) as stressors, with characteristics of critical incidents mentioned second most frequently (705 times).

The category that we describe as “working conditions” included the inevitable problems of shift work (such as sleep disruptions and being away from family) and working in a job that alternates between periods of boredom and fast paced work. In addition, other problems such as low salaries, lack of or faulty equipment, hazardous working conditions, and crime were also mentioned. This category also included concerns about teamwork and competence of co-workers (301 mentions). Similar concerns about management not communicating and not taking the concerns of staff members seriously were mentioned 359 times. Other organisational stressors were also reported: these included racism, lack of personnel, concerns about the future of the professions, changes in service structures, a lack of attention to training and debriefing, and problems in co-operation between services (303 mentions).

Characteristics of critical incidents captured in the open ended questions included not knowing what to expect when called out, assisting family members with identification of bodies, and notifying the family of a death. In addition, staff members identified it as stressful when their help is refused. Particular mention was made of informal housing settlement fires, which seemed to bring together the stressors of multiple tragedies, burn wounds, helplessness in the face of disaster, difficult working conditions (especially where shacks are too close together for equipment to reach the fire), and, frequently, danger from members of the public. In addition, these fires raise the likelihood that the victims lose all their possessions, and a few respondents noted that they found it particularly stressful to watch this happening.

Finally, while the questions were not intended to elicit this response, 34 people either responded that they had “no stress” or that they enjoyed their jobs.

DISCUSSION

Our data reveal a higher prevalence of exposure than is found in similar studies in the developed world. Compared with a study of US fire personnel (who achieved a median on the CCI of 8.5; range 0 to 53⁴) our sample had far greater exposure. Similarly, in a study of Swedish ambulance drivers, 61.6% reported ever experiencing a critical incident,¹³ whereas over 88% of our sample had experienced a critical incident in the past 2 months alone. A feature that appeared unique to our context is the multiple stressors arising from dealing with fires in informal settlements.

For all but the sea rescue service, our data reveal higher rates of general psychopathology than found by studies of Scottish¹⁴ and English¹⁵ ambulance personnel (caseness rates of 32% and 22% respectively). In addition, it is clear from our

Table 2 Critical incident exposure and mental health indices by service

Service	Critical incident exposure, n (mean) (95% CI)	GHQ, n (%) (95% CI)	CAGE, n (%) (95% CI)	Impact of Event Scale – Revised, n (mean) (95% CI)	Psychological aggression, n (mean) (95% CI)	Physical assault, n (mean) (95% CI)
Public and private AS	295 (20.59) (19.11 to 22.06)	286 (45.10) (40.24 to 49.97)	182 (22.53) (16.94 to 28.12)	290 (2.40) (2.17 to 2.63)	304 (4.52) (4.11 to 4.92)	306 (1.91) (1.53 to 2.29)
Fire	314 (17.03) (15.64 to 18.41)	295 (40.68) (35.99 to 45.37)	225 (24.00) (19.03 to 28.97)	311 (2.31) (2.08 to 2.53)	318 (4.48) (4.11 to 4.85)	319 (2.08) (1.70 to 2.46)
Traffic police	260 (12.25) (11.08 to 13.43)	253 (47.83) (47.14 to 57.21)	160 (18.75) (13.20 to 24.30)	264 (2.06) (1.82 to 2.30)	268 (4.24) (3.85 to 4.62)	267 (1.28) (1.02 to 1.55)
Sea rescue	93 (5.29) (3.97 to 6.61)	90 (21.11) (13.69 to 28.53)	90 (16.67) (9.92 to 23.42)	94 (0.79) (0.57 to 1.01)	95 (1.62) (1.15 to 2.09)	96 (1.02) (0.33 to 1.71)
Defence force	56 (4.55) (2.49 to 6.61)	53 (45.28) (33.53 to 57.04)	34 (34.29) (19.36 to 49.21)	54 (1.60) (1.04 to 2.15)	55 (5.11) (3.97 to 6.24)	54 (3.24) (1.80 to 4.68)
Volunteer AS	34 (13.38) (9.77 to 17.00)	35 (65.71) (50.91 to 80.53)	12 (8.33) (0.00 to 27.29)	35 (2.27) (1.59 to 2.95)	35 (3.86) (2.91 to 4.80)	35 (1.17) (0.27 to 2.07)
Whole sample	1052 (15.03) (14.35 to 15.71)	1012 (44.17) (41.65 to 46.69)	604 (21.73) (19.00 to 24.46)	1048 (2.10) (1.98 to 2.21)	1075 (4.19) (3.99 to 4.39)	1077 (1.77) (1.58 to 1.96)

*Percentage achieving “caseness”. AS, ambulance services.

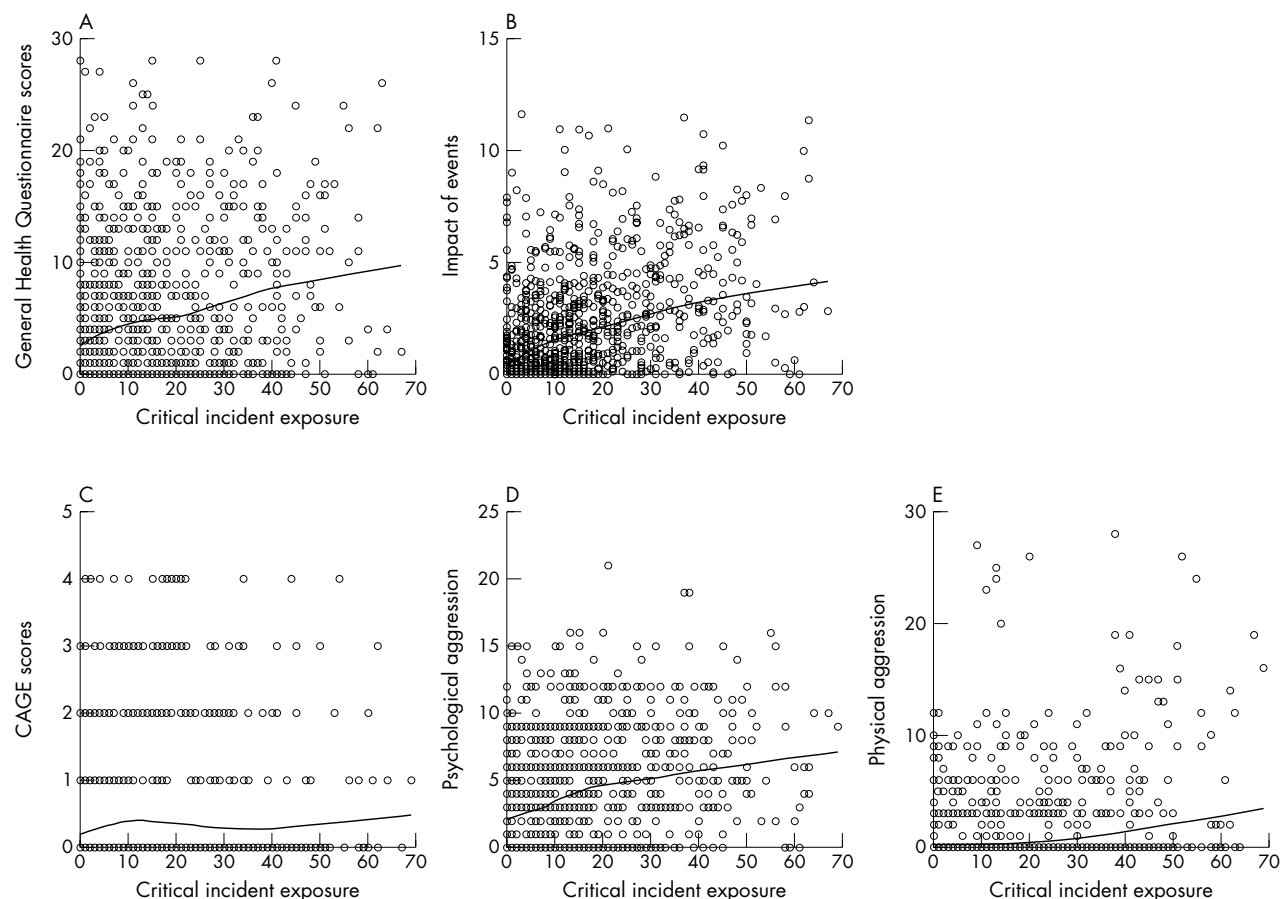


Figure 1 Lowess representations of associations between critical incident exposure and mental health indices.

findings that symptoms of anxiety, depression, and PTSD, and experience of both physical and psychological aggression increase, without levelling off, as exposure to critical incidents increases, although rate of increase may slow as exposure increases.

Although these findings are true for all the services, certain groups are more at risk for experiencing aggression. Members of the defence force are more likely to be assaulted, as are younger members of ambulance services. In addition, women across all the services are more at risk for being the victims of psychological aggression.

Our finding of higher rates of anxiety and depression, however, is in line with the typical gender expression of distress; in the general population, women are more likely than men to develop anxiety and depression, while men tend to demonstrate distress more frequently via aggression or substance abuse.¹⁶ As our data did not directly measure externalising disorders in men, our finding that rates of anxiety and depression are higher in women may thus indicate only that this is the form women's response to critical incident exposure takes. Services should be alert to the possibility that there is a gender dependent response to

Table 3 Estimated coefficients from linear regression models, regressing mental health indices on critical incident exposure and controlling for sex, age, length of service and service type

	GHQ		CAGE		IESR		PA	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Critical incident exposure	0.121†	0.015	0.003	0.005	0.101	0.014	0.149	0.026
Square of critical incident exposure	–	–	–	–	–0.007‡	0.000	–0.001†	0.001
Sex (female)	2.175†	0.595	–0.314	0.277	0.336	0.205	0.003	0.374
Age (≤ 27 years)	–0.115	0.475	0.197	0.164	0.020	0.165	0.305	0.302
Length of service (≤ 3 years)	–0.432	0.499	–0.18	0.175	–0.058	0.172	–0.476	0.315
Service:								
Public and private ambulance services*	–1.885†	0.567	0.307	0.213	–0.265	0.197	–0.420	0.358
Fire*	–1.676†	0.549	0.255	0.195	0.021	0.189	–0.238	0.345
Sea rescue*	–3.344†	0.774	–0.304	0.227	–0.676‡	0.269	–1.908†	0.492
Defence force*	0.977	0.948	0.512	0.327	0.337	0.333	1.757†	0.606
Volunteer ambulance services*	–0.329	1.180	2.328	1.301	0.093	0.408	–0.320	0.739
Intercept	5.033	0.477	0.956†	0.176	0.945	0.183	2.942	0.333

*Traffic police served as the reference group. † $p < 0.01$; ‡ $p < 0.05$. GHQ, General Health Questionnaire; IESR, Impact of Event Scale – Revised; PA, psychological aggression; Coeff., coefficient; SE, standard error.

Table 4 Estimated coefficients from the linear regression model, regressing the physical assault index on critical incident exposure adjusted for sex, age, and length of service by service type

	Public and private AS		Fire services		Traffic police		Volunteer AS		Sea rescue		Defence force	
	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE	Coeff.	SE
Critical incident exposure	-0.015	0.042	0.026	0.047	-0.001	0.039	0.053	0.110	0.126	0.145	0.475	0.250
Square of critical incident exposure	0.002‡	0.001	0.001	0.001	0.001	0.001	-0.001	0.002	-0.004	0.005	0.006	0.006
Sex (female)	-0.092	0.556	1.476	0.982	0.705	0.484	-0.542	1.112	0.465	1.289	-4.822	3.155
Age (≤ 27 years)	1.428†	0.480	0.797	0.574	-0.394	0.466	2.671‡	1.071	0.771	0.954	3.414	2.533
Length of service (≤ 3 years)	-0.263	0.476	-0.403	0.772	0.135	0.413	1.141	-0.520	0.479	0.949	2.527	2.750
Intercept	0.369	0.562	0.901	0.473	0.870‡	0.343	0.268	1.252	0.175	0.719	0.870	1.113

† $p < 0.01$, ‡ $p < 0.05$. GHQ, General Health Questionnaire; AS, ambulance services; Coeff., coefficient; SE, standard error.

critical incident exposure, rather than assuming that women are more vulnerable.

Our finding that there is no association between critical incident exposure and alcohol use is similar to other studies from a variety of developed world contexts.^{17, 18} Despite this, rates of problem drinking in this population are high and services should be alert to this possibility among their staff.

The responses to the open ended questions revealed that death notification and dealing with family members of injured victims are also particular stressors that emergency services personnel face. Although other literature identifies death notification as stressful,¹⁹ emergency services personnel seldom receive particular training in this area.²⁰

The responses to our open ended questions shed further light on other areas that may be difficult for emergency services personnel. As has been found in other contexts,⁵ problems within and between organisations were found to be stressful for the emergency services. It is very likely that these organisational stressors interact with the characteristics of critical incidents and may move them from being merely "incidents" to being "critical incidents". For instance, where there are no clear co-operation agreements between services, there is likely to be confusion when members of several services respond to an incident and this confusion may lead to greater loss of life.

This study does have several limitations. Firstly, as this is a cross sectional study, we can only note associations between critical incidents and mental health and behavioural problems. While (for instance) exposure to critical incidents leads to depression, depressed personnel may be more likely to make mistakes on the job, and hence experience more incidents that become "critical". Secondly, we relied on retrospective data for the critical incidents, and on self report data throughout. Furthermore, the cross sectional nature of the study does not make it possible to determine whether the "caseness" registered here is simply an immediate response to critical incident exposure that will be remedied over time, or whether this reflects a more enduring, persistent harm. Prospective studies that follow staff over long periods of time will be more able to detect the duration and direction of effects. Similarly, the GHQ was developed for a primary care population,⁷ which one would expect to have lower rates of "caseness". It may be that in this particular population new norms need to be established.

CONCLUSIONS

The high rates of exposure to critical incidents and of mental health and behavioural problems should be of concern to service organisations, which should make it a priority to provide appropriate interventions to their members. Following Haddon's notions of injury prevention,²¹ services may find it useful to think of such interventions as falling into pre-exposure, exposure, and post-exposure categories.

Pre-exposure, attention to organisational issues within and between services may assist in preventing poor mental health outcomes. In addition, staff should receive training in dealing with family members of the injured and in death notification, as training may assist to reduce the stress of this inevitable part of the work. During incidents, steps should be taken to minimise exposure as much as possible (for instance, taking breaks while fighting a fire). Post-exposure, early identification of staff in trouble may prevent the worsening of symptoms and facilitate improved coping in future critical incidents.²² In particular, services should be alert to the possibility of aggression between staff members, and should consider workplace programmes dedicated to supporting vulnerable groups and to addressing appropriate expressions of anger. This is particularly important in light of the serious nature of aggressive incidents reported by some respondents.

In summary, our data reveal strong and clear associations between critical incident exposure and indicators of just how stressful this can be for emergency services personnel. We are left to note our admiration for all they do to provide an essential service under difficult circumstances.

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